

NOMENCLATURAL CHANGES IN *SETARIA* AND *PASPALIDIUM* (POACEAE: PANICEAE)

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ABSTRACT

A historical perspective and discussion of the generic relationships is presented for *Paspalidium* and *Setaria*. It is concluded that species of *Paspalidium* are best treated as *Setaria*. A list of accepted taxa previously placed in *Paspalidium* is given. Nineteen new combinations (*Setaria albovillosa*, *S. aversa*, *S. basiclada*, *S. clementii*, *S. constricta*, *S. criniformis*, *S. gausa*, *S. globoidea*, *S. spartela*, *S. grandispiculata*, *S. inaequalis*, *S. jubiflora*, *S. paludivaga*, *S. rara*, *S. reflexa*, *S. retiglumis*, *S. scabrifolia*, *S. tabulata*, *S. uda*) and one new name (*Setaria brigalow*) are proposed.

RESUMEN

Se presenta una perspectiva histórica y una discusión de las relaciones genéricas de *Paspalidium* y *Setaria*. Se concluye que las especies de *Paspalidium* están mejor tratadas en *Setaria*. Se ofrece una lista de los taxa aceptados colocados previamente en *Paspalidium*. Se proponen diez y nueve combinaciones nuevas (*Setaria albovillosa*, *S. aversa*, *S. basiclada*, *S. clementii*, *S. constricta*, *C. criniformis*, *S. gausa*, *S. globoidea*, *S. spartela*, *S. grandispiculata*, *S. inaequalis*, *S. jubiflora*, *S. paludivaga*, *S. rara*, *S. reflexa*, *S. retiglumis*, *S. scabrifolia*, *S. tabulata*, *S. uda*) y un nombre nuevo (*Setaria brigalow*).

INTRODUCTION

The generic distinction between *Paspalidium* Stapf and *Setaria* P. Beauv. has been a topic of academic interest among agrostologists knowledgeable in the phenetic relationship between these genera. *Setaria* includes about 114 species (Webster 1993) concentrated in the tropics and sub-tropics of the world. Presence of bristles, disarticulation at the base of the spikelets, indurate upper floret, and a muticous upper floret are characters that separate *Setaria* from other genera of the Paniceae R. Br. (Webster 1992). *Paspalidium* includes about 28 species. It is concentrated in Australia where Webster (1987) recognized 23 species. The remaining five species are native to Asia and Africa.

Stapf (1920) separated *Paspalidium* from *Setaria* on inflorescence form and structure. That is, *Paspalidium* was characterized by racemose primary branches and *Setaria* by a contracted spike-like panicle. Subsequent authors used similar characters and the presence or absence of bristles to separate the genera.

Hitchcock and Chase (1910) separated *Panicum* subgenus *Paurochaetum* from other species of *Panicum* on the presence of a point or bristle extending beyond the uppermost spikelet in subg. *Paurochaetum*. Pilger (1940) placed subgenus *Paurochaetum* as a section of *Setaria*. Hitchcock (1951) separated *Setaria* from *Panicum* on the presence of bristles forming an involucre in *Setaria*, but retained *Paurochaetum* in *Panicum*. Rominger (1962) did not discuss *Paspalidium* but placed *Paurochaetum* as a subgenus of *Setaria*.

Veldkamp (1980) noted that *Paspalidium* was probably not distinct from *Setaria*. Clayton and Renvoize (1986) did not formally place *Paurochaetum*. They recognized both *Setaria* and *Paspalidium* but indicate that intermediate species make the distinction arbitrary.

A complete comparative treatment of the 23 Australian *Paspalidium* was presented by Webster (1987). I stated the following: "Contrary to what the various flora treatments in North America, Africa, and Australia lead one to believe, *Paspalidium* cannot be distinguished from *Setaria* on the presence or absence of bristles and the spikelet characteristics are essentially identical. The bristle to spikelet relationships in *Setaria* are so varied that it cannot be used to separate the genera." I tentatively distinguished these genera on the arrangement of the primary inflorescence branches. *Paspalidium* was characterized by secund or distichous primary branches, whereas in *Setaria* the primary branches could originate from any point on the main axis (i.e. quaquaversal). This character was applied in subsequent publications distinguishing among the Paniceae genera (Webster 1988; Webster & Valdes-Reyna 1988; Webster et al. 1989; Webster 1992).

Davidse and Pohl (1992) stated that *Paspalidium* is characterized by abaxial spikelets born in unilateral spikes. They made new combinations in *Paspalidium* for *Setaria chapmanii* and six West Indian species with an inflorescence form similar to the Australian *Paspalidium*. The New World mainland taxa with similar inflorescence characteristics to those of the Australian and West Indian "*Paspalidiums*" groups were retained in *Setaria*.

Webster (1993) stated that "when the full range of variation in *Setaria* is considered, it is morphologically identical to *Paspalidium*." Finally, Veldkamp (1994) concluded that *Paspalidium* cannot be delimited from *Setaria*. He reduced it to *Setaria*, and transferred the Southeast Asian species to *Setaria*, including the type species of *Paspalidium*.

In review, all species of *Paspalidium* possess a bristle terminating a branch. The spikelets are arranged in a tight or loose arrangement on the branches depending on the number of spikelets and the length of the pedicels. In some species, bristles subtend all spikelets whereas in others only the terminal spikelet of a branch is subtended by a bristle. There is continuous variation between these forms. A wide range in variation for these characters is also found in *Setaria*. As in *Paspalidium*, the bristle to spikelet rela-

tionship is correlated to the development of the primary branches. Species with elongate or pronounced primary branches frequently have some spikelets that lack subtending bristles. However, a bristle will terminate the primary and secondary branches. Arrangement of the primary branches (i.e. secund, distichous, and quaquaversal) is difficult to apply and the generic significance is open to question. Since the genera cannot be satisfactorily separated, *Paspalidium* is best treated as a synonym of *Setaria*. A comprehensive phylogenetic study of *Setaria* is required before a decision is made concerning the recognition of subgenera and sections within *Setaria*.

The following is an alphabetical list of accepted species with new combinations where needed.

SPECIES LIST

Setaria albovillosa (S.T. Blake) R.D. Webster, comb. nov. *Paspalidium albovillosum* S.T. Blake, Proc. Roy. Soc. Queensland 62:96. 1952. TYPE: *Blake 10947* (HOLOTYPE: BRI!; ISOTYPE: CANB!).

Paspalidium radiatum var. *hirsutum* Vickery, Contr. New South Wales Natl. Herb. 1:334. 1951. TYPE: *C.O. Cross NSW no. 8944* (HOLOTYPE: NSW!).

Distribution.—Australia: woodlands of Queensland and New South Wales.

Setaria aversa (Vickery) R.D. Webster, comb. nov. *Paspalidium aversum* Vickery, Contr. New South Wales Natl. Herb. 1:331. 1951. TYPE: *T.F. Mau s.n.* (HOLOTYPE: NSW no. 8992!).

Distribution.—Australia: woodlands of Queensland and New South Wales.

Setaria basiclada (Hughes) R.D. Webster, comb. nov. *Paspalidium basicladum* Hughes, Bull. Misc. Inform. 318. 1923. TYPE: *Stoward 200* (HOLOTYPE: K!).

Distribution.—Australia: shrublands, grassland, and arid regions of Western Australia, Northern Territory, South Australia, and Queensland.

Setaria brigalow R.D. Webster, nom. nov. *Paspalidium caespitosum* C. E. Hubb., Bull. Misc. Inform. 446. 1934, non *Setaria caespitosa* Hack. & Arechav. 1894. TYPE: *Hirschfeld s.n.* (HOLOTYPE: K!). This species is commonly known as "Brigalow Grass" and occurs in the Brigalow vegetation region of Australia.

Distribution.—Australia: woodlands to arid shrublands of Queensland and New South Wales.

Setaria chapmanii (Vasey) Pilg. in Engl. & Prantl, Nat. Pflanzenfam. (ed. 2) 14e:72. 1940. *Paspalidium chapmanii* (Vasey) R. W. Pohl, Novon 2:106. 1992. *Panicum chapmanii* Vasey, Bull. Torrey Bot. Club 11:61. 1884, as *P. "chapmani."* TYPE: *Chapman s.n.* (LECTOTYPE, selected by Hitchcock & Chase 1910, US!).

Distribution.—United States: Florida. Mexico: Yucatan. West Indies: Cuba and Bahamas.

Setaria clementii (Domin) R.D. Webster, comb. nov. *Paspalidium clementii* (Domin) C. E. Hubb., Bull. Misc. Inform. 447. 1934. *Panicum clementii* Domin, J. Linn. Soc., Bot. 41:272. 1912. TYPE: *E. Clement s.n.* (HOLOTYPE: either BM or PR).

Distribution.—Australia: arid grasslands and shrublands of Western Australia, Northern Territory, South Australia, Queensland, and New South Wales.

Setaria constricta (Domin) R.D. Webster, comb. nov. *Paspalidium constrictum* (Domin) C. E. Hubb., Bull. Misc. Inform. 447. 1934. *Panicum constrictum* Domin, Biblioth. Bot. 20(85):302. 1915. *Panicum flavidum* var. *tenuis* Benth., Fl. Austral. 7:474. 1878. TYPE: *Domin II* 1910 (HOLOTYPE: PR).

Distribution.—Australia: arid grasslands and shrublands of Western Australia, Northern Territory, South Australia, Queensland, and New South Wales.

Setaria criniformis (S.T. Blake), R.D. Webster, comb. nov. *Paspalidium criniforme* S.T. Blake, Proc. Roy. Soc. Queensland 62:98. 1952. TYPE: *S.T. Blake* 5282 (BRI).

Paspalidium gracile (R. Br.) Hughes var. *debile* Vickery, Contr. New South Wales Natl. Herb. 1:331. 1951. TYPE: *J.H. Camfield* 5, 1901 (NSW no. 9168!).

Distribution.—Australia: woodlands and shrublands of Queensland and New South Wales.

Setaria distans (Trin.) Veldkamp, Blumea 39:376. 1994. *Paspalidium distans* (Trin.) Hughes, Bull. Misc. Inform. 317. 1923. *Panicum distans* Trin., Spec. Gram. 2:t. #172. 1829, non Saltz. ex Steud. 1853. TYPE: *R. Brown* 6098 (HOLOTYPE: K; ISOTYPE: BM!).

Panicum commixtum Steud., Syn. Pl. Glum. 1:59. 1853. TYPE: *d'Urville s.n.* (HOLOTYPE: P). *Paspalidium radiatum* Vickery, Contr. New South Wales Natl. Herb. 1:332. 1950. TYPE: *E. Cheel* 3, 1907 (HOLOTYPE: NSW, K). *Paspalidium disjunctum* S.T. Blake, Proc. Roy. Soc. Queensland 84:65. 1973. TYPE: *S.T. Blake* 19899 (HOLOTYPE: BRI).

Distribution.—Australia: woodlands of Queensland and New South Wales. Malesia: New Guinea.

Setaria distantiflora (A. Rich.) Pilg. in Engl. & Prantl, Nat. Pflanzenfam. (ed. 2) 14e:72. 1940. *Paspalidium distantiflorum* (A. Rich.) Davidse & R. W. Pohl, Novon 2:106. 1992. *Panicum distantiflorum* A. Rich. in Sagra, Hist. Fis. Cuba, Bot. 11:302. 1850. TYPE: *Sagra s.n.* (HOLOTYPE: P).

Distribution.—West Indies: Cuba and Bahamas.

Setaria flavida (Retz.) Veldkamp, Blumea 39:376. 1994. *Paspalidium flavidum* (Retz.) A. Camus in Lecomte, Fl. Gen. de l'Indo-Chine 7:419. 1922. *Panicum flavidum* Retz., Obs. Bot. 4:15. 1786. TYPE: *Koenig s.n.* (HOLOTYPE: LD?).

Distribution.—India, southeast Asia, Pacific islands, and Australia (Queensland).

Setaria gausa (S.T. Blake) R.D. Webster, comb. nov. *Paspalidium gausum* S.T. Blake, Proc. Roy. Soc. Queensland 84:68. 1973. TYPE: *S.T. Blake 19914* (HOLOTYPE: BRI).

Distribution.—Australia: woodlands of Queensland and New South Wales.

Setaria geminata (Forssk.) Veldkamp, Blumea 39:377. 1994. *Paspalidium geminatum* (Forssk.) Stapf, Fl. Trop. Afr. 9:585. 1920. *Panicum geminatum* Forssk., Fl. Aegypt.-Arab. 18. 1775. TYPE: *Forsskal s.n.* (HOLOTYPE: C).

Distribution.—Native to Africa and Asia, now widely introduced in the tropics and subtropics of the world.

Setaria geminata (Forssk.) Veldkamp var. ***paludivaga*** (Hitchc. & Chase) R.D. Webster, comb. nov. *Paspalidium geminatum* (Forssk.) Stapf var. *paludivagum* (Hitchc. & Chase) Gould, Southw. Naturalist 15:391. 1971. *Paspalidium paludivagum* (Hitchc. & Chase) Parodi, Gram. Bonaer. ed. 3. 85, 89. 1939. *Panicum paludivagum* Hitchc. & Chase, Contr. U.S. Natl. Herb. 15:132. 1910. TYPE: *Nash 746* (HOLOTYPE: US!).

Distribution.—Wet areas of United States (Florida), Mexico, Guatemala, and West Indies.

Setaria globoidea (Domin) R.D. Webster, comb. nov. *Paspalidium globoideum* (Domin) Hughes, Bull. Misc. Inform. 317. 1923. *Panicum globoideum* Domin, Repert. Spec. Nov. Regni Veg. 10:119. 1911. TYPE: *Wuth s.n.* (LECTOTYPE: K).

Distribution.—Australia: woodlands of Queensland and New South Wales.

Setaria grandispiculata (B. K. Simon) R.D. Webster, comb. nov. *Paspalidium grandispiculatum* B. K. Simon, Austrobaileya 1:465. 1982. TYPE: *Peart 1990* (HOLOTYPE: BRI!; ISOTYPES: CANB!, K, L, MO, NSW!).

Distribution.—Australia: woodlands of Queensland.

Setaria inaequalis (F. Muell.) R.D. Webster, comb. nov. *Paspalidium inaequale* (F. Muell.) Hughes, Bull. Misc. Inform. 317. 1923. *Panicum inaequale* F. Muell., Frag. 8:189. 1874. TYPE: *Mueller s.n.* (HOLOTYPE: MEL; ISOTYPE: K).

Distribution.—Australia: tropical woodlands of Queensland.

Setaria jubiflora (Trin.) R.D. Webster, comb. nov. *Paspalidium jubiflorum* (Trin.) Hughes, Bull. Misc. Inform. 317. 1923. *Panicum jubiflorum* Trin., Gram. Pan. Diss. 2:130. 1826. *Panicum flavidum* var. *jubiflorum* (Trin.) Domin, Biblioth. Bot. 20(85):300. 1915. TYPE: *Lindley s.n.* (HOLOTYPE: CGE?).

Distribution.—Australia: arid grassland to sub-humid woodlands of Western Australia, Northern Territory, South Australia, Queensland, and New South Wales.

Setaria leonis (Ekman ex Hitchc.) Léon, Contr. Ocas. Mus. Hist. Nat. Colegio "De La Salle" 8:163. 1946. *Paspalidium leonis* (Ekman ex Hitchc.) Davidse & R. W. Pohl, Novon 2:106. 1992. *Panicum leonis* Ekman ex Hitchc., Man. Grasses W. Ind. 295. 1936. TYPE: *Ekman 13155* (HOLOTYPE: US!).

Distribution.—West Indies: Cuba.

Setaria ophiticola (Hitchc. & Ekman) Léon, Contr. Ocas. Mus. Hist. Nat. Colegio "De La Salle" 8:163. 1946. *Paspalidium ophiticola* (Hitchc. & Ekman) Davidse & R. W. Pohl, Novon 2:106. 1992. *Panicum ophiticola* Hitchc. & Ekman in Hitchc., Man. Grasses W. Ind. 293. 1936. TYPE: *Ekman 12712* (HOLOTYPE: US!).

Distribution.—West Indies: Cuba.

Setaria pradana (Léon ex Hitchc.) Léon, Contr. Ocas. Mus. Hist. Nat. Colegio "De La Salle" 8:164. 1946. *Paspalidium pradatum* (Léon ex Hitchc.) Davidse & R. W. Pohl, Novon 2:106. 1992. *Panicum pradatum* Léon ex Hitchc., Man. Grasses W. Ind. 294. 1936. TYPE: *Léon 11710* (HOLOTYPE: US!).

Distribution.—West Indies: Cuba.

Setaria punctata (Burm. f.) Veldkamp, Blumea 39:381. 1994. *Paspalum punctatum* (Burm. f.) Stapf ex Ridl., Fl. Malay Penins. 5:218. 1925. *Paspalidium punctatum* (Burm. f.) A. Camus in Lecomte, Fl. Gen. Indo-Chine 7:419. 1922. *Panicum punctatum* Burm. f., Fl. Ind. 26. 1768. TYPE: *Plukenet* (LECTOTYPE, selected by Clayton & Renvoize 1982, BM).

Paspalidium mucronatum (Roem. & Schult.) Ohwi, Acta Phytotax. Geobot. 11:33. 1942. *Panicum mucronatum* Roem. & Schult., Syst. Veg. 2:425. 1817. TYPE: *Heyne* (B, probably destroyed).

Distribution.—Africa, Asia, and Pacific Islands.

Setaria rara (R. Br.) R.D. Webster, comb. nov. *Paspalidium rarum* (R. Br.) Hughes, Bull. Misc. Inform. 318. 1923. *Panicum rarum* R. Br., Prodr. 189. 1810. TYPE: *R. Brown 6100* (HOLOTYPE: K).

Distribution.—Australia: arid grasslands and sub-humid woodlands of Western Australia, Northern Territory, Queensland, and New South Wales.

Setaria reflexa (R.D. Webster) R.D. Webster, comb. nov. *Paspalidium reflexum* R.D. Webster, Australian Paniceae 166. 1987. TYPE: *Latz 4847* (HOLOTYPE: NT).

Distribution.—Australia: arid grasslands of Western Australia, Northern Territory, and South Australia.

Setaria retiglumis (Domin) R.D. Webster, comb. nov. *Paspalidium retiglume* (Domin) Hughes, Bull. Misc. Inform. 317. 1923. *Panicum retiglume* Domin, Repert. Spec. Nov. Regni Veg. 10:119. 1911. TYPE: *Mueller s.n.* (HOLOTYPE: MEL; ISOTYPE: K).

Distribution.—Australia: woodlands of Western Australia, Northern Territory, and Queensland.

Setaria scabrifolia (S.T. Blake) R.D. Webster, comb. nov. *Paspalidium scabrifolium* S.T. Blake, Proc. Roy. Soc. Queensland 84:69. 1973. TYPE: *Blake 19983* (HOLOTYPE: BRI).

Distribution.—Australia: woodlands of Queensland.

Setaria spartellum (S.T. Blake) R.D. Webster, comb. nov. *Paspalidium spartellum* S.T. Blake, Proc. Roy. Soc. Queensland 62:97. 1952. TYPE: *Blake 9939* (HOLOTYPE: BRI!).

Paspalidium gracile (R. Br.) Hughes, Bull. Misc. Inform. 318. 1923 *Panicum gracile* R. Br., Prodr. 190. 1810, non *Setaria gracilis* Kunth (1824), nec Spreng. ex Trin. (1835). TYPE: *R. Brown 6096* (HOLOTYPE: K).

Distribution.—Australia: woodlands, shrublands, and grasslands of Western Australia, Northern Territory, Queensland, and New South Wales.

Setaria subtransiens Hitchc. & Ekman in Hitchc., Man. Grasses W. Ind. 351. 1936. *Paspalidium subtransiens* (Hitchc. & Ekman) Davidse & R. W. Pohl, Novon 2:106. 1992. TYPE: *Ekman 16828* (HOLOTYPE: US).

Distribution.—West Indies: Cuba.

Setaria tabulata (Hack.) R.D. Webster, comb. nov. *Paspalidium tabulatum* (Hack.) C. E. Hubb., Bull. Misc. Inform. 448. 1934. *Panicum tabulatum* Hack., Bot. Jahrb. Syst. 6:234. 1885. TYPE: *Naumann s.n.* (HOLOTYPE: K).

Distribution.—Australia: shrublands and grasslands of Western Australia.

Setaria uda (S.T. Blake) R.D. Webster, comb. nov. *Paspalidium udum* S.T. Blake, Proc. Roy. Soc. Queensland 62:98. 1952. TYPE: *S.T. Blake 16659* (HOLOTYPE: BRI; CANB).

Distribution.—Australia: tropical woodlands of Northern Australia and Queensland.

Setaria utowanaea (Scribn.) Pilg. in Engl. & Prantl, Nat. Pflanzenfam. (ed. 2) 14e:72. 1940. *Paspalidium utowanaeum* (Scribn.) Davidse & R. W. Pohl, Novon 2:106. 1992. *Panicum utowanaeum* Scribn. in Millsp., Publ. Field Columbian Mus., Bot. Ser. 2:25. 1900. TYPE: *Millspaugh 702* (HOLOTYPE: F).

Distribution.—West Indies: Greater and Lesser Antilles.

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